Intel® Education
Lab Camera
by Intellisense

Intel® Education Lab Camera by Intellisense

Android User manual

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INTRODUCTION

Lab Camera is a web camera based natural science exploration and data logging laboratory that allows students and teachers to carry out substantial scientific observations and measurements, using a computer and the software.

The software has currently seven functions all of them are very easy to use. Students can use it in class or even to solve their homework, but it also encourages independent experiments that can be carried out effectively, giving further boosts to Science based subjects. Lab Camera arouses curiosity about the surrounding world around you and it ignites creativity in how you explore it.

This User Guide provides an overview of the components and all features of LabCam.

Enjoy experimenting!

GENERAL INFORMATION

Protect the environment & yourself

Please do not harm any animals, plants, or the surrounding environment when you carry out experiments with LabCam. Experiment responsibly and carefully for your own safety. Lab Camera takes no responsibility for any damages that might occur during your use of the software. While we are confident that Lab Camera is one of the safest ways to undertake science experiments, please enjoy the software at your own risk!

COMMON FEATURES

Slide down top bar

Home | Close current module and return to the main menu.

Quickguide | Display a semi-transparent guide canvas over your current application function.

About | Display version and copyright information.

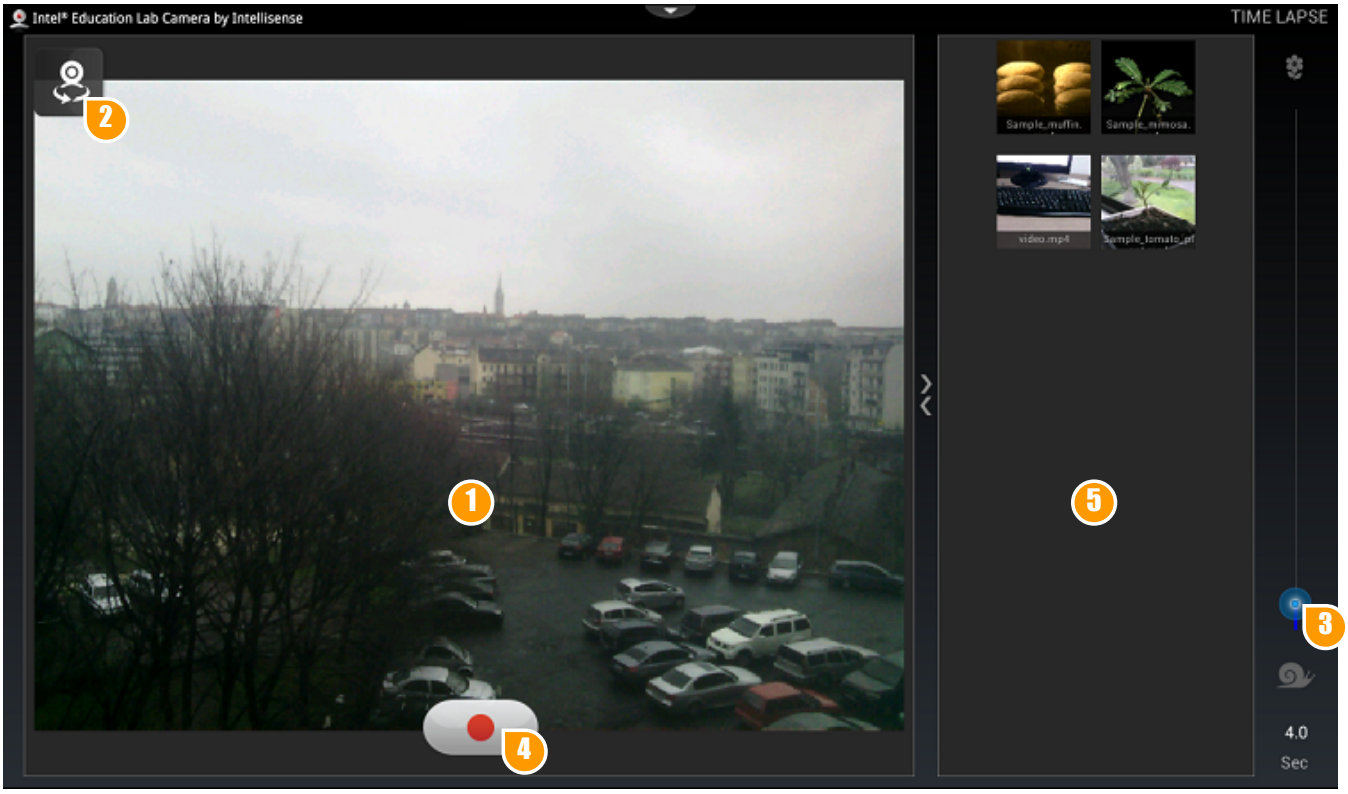
Toggle camera | Toggle front and rear cameras

Resize panels | Change thumblist and main panel size ratio.

TIME LAPSE

The Time Lapse function helps you observe and better understand the slow processes in nature, such as the formation and migration of clouds, ice melting, the growth of plants, etc. The software makes still shots in configurable intervals and stitches these images into a coherent stream of video.

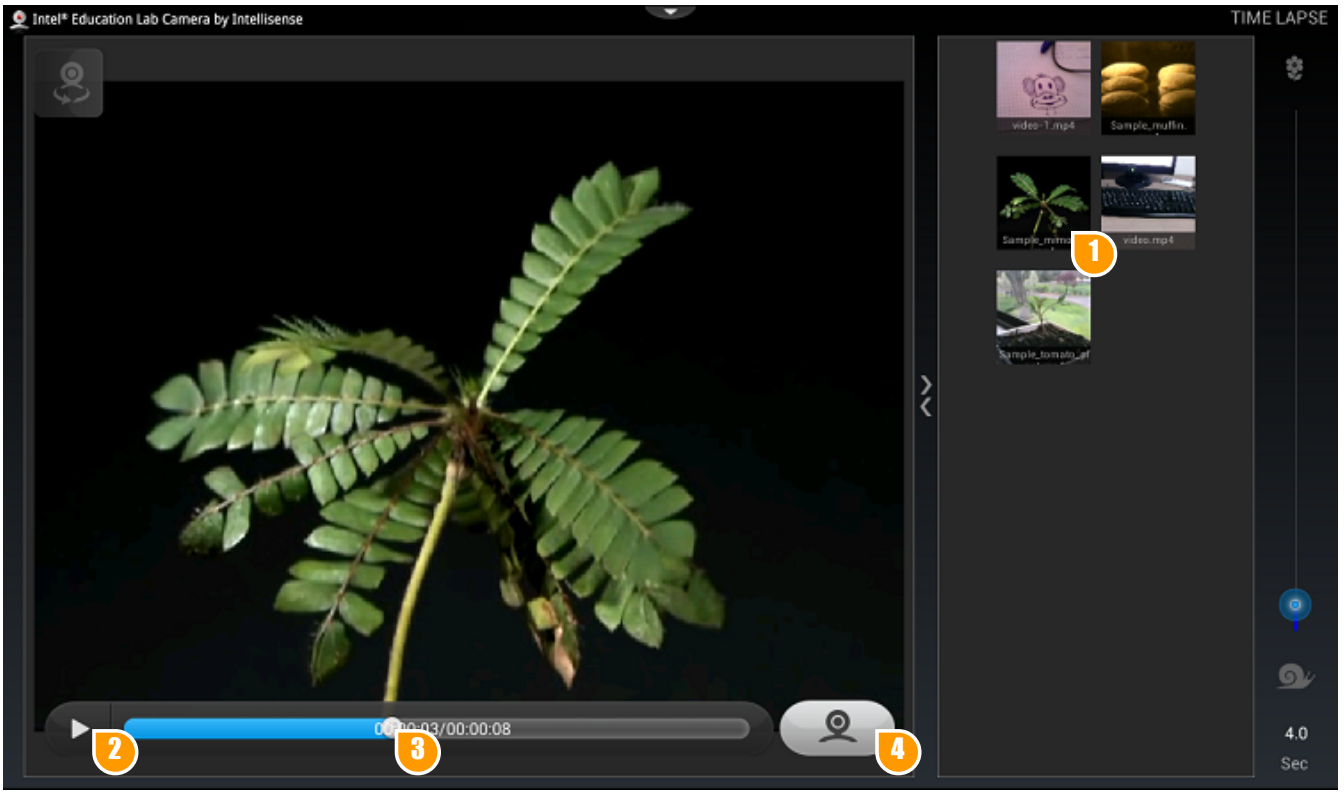
Recording Mode



1. Your camera will start automatically upon software start up. Its stream will be visible in the camera window.
2. Toggle front/rear camera.
3. Set time interval between frames.
4. Press Record button to start recording. A red frame around the camera window will start blinking.

   Press again to stop recording. Your recorded video will start automatically. NOTE: Videos shorter than 20 frames will not get saved!
5. Your recorded video will be added to the thumb list. The video file will be saved to your external storage in "/Lab Camera/TimeLapse" folder.

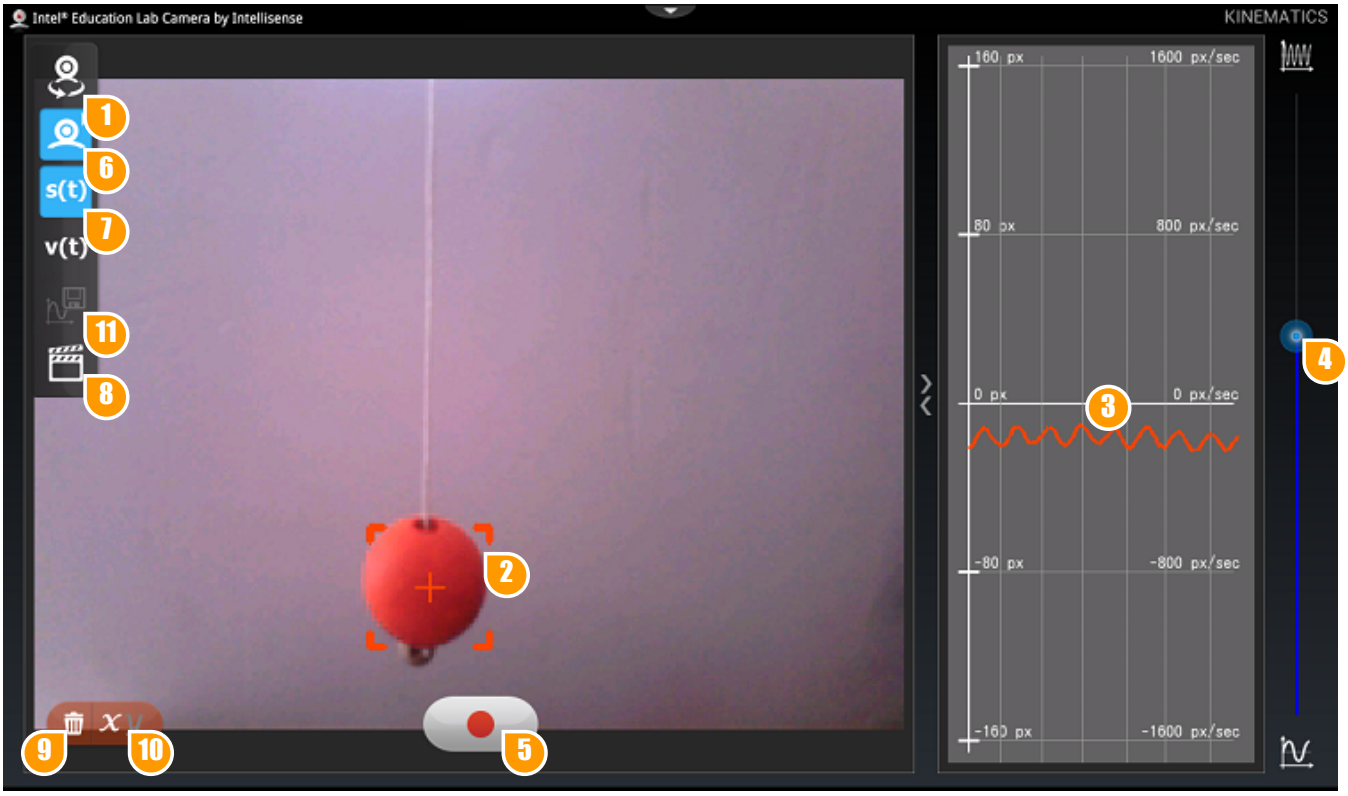
Playback Mode.



1. Press a thumbnail to play back video.
2. Press to play / pause video.
3. Use the seek bar to jump to desired fragment.
4. Switch to camera view.

KINEMATICS

The Kinematics function allows tracking of the horizontal and vertical movement characteristics (displacement, velocity, and acceleration) of one or more objects in real time. The software is capable to capture a maximum of 3 selected objects at the same time, allowing complex kinematic experiments.



1. Toggle front/rear camera.
2. Press the screen to select the object for tracking. When selected, the object will be bounded by a colored frame. You can select up to 3 objects.
3. Object characteristics (displacement s(t), velocity v(t)) will be displayed in the diagram panel.
4. Set diagram density.
5. Press to start recording. A red frame around the camera window will start blinking.
6. Press this button to choose from the following options:

Default camera view.

Eliminate background. This view will display your object as a circle colored to the color of your object(s).

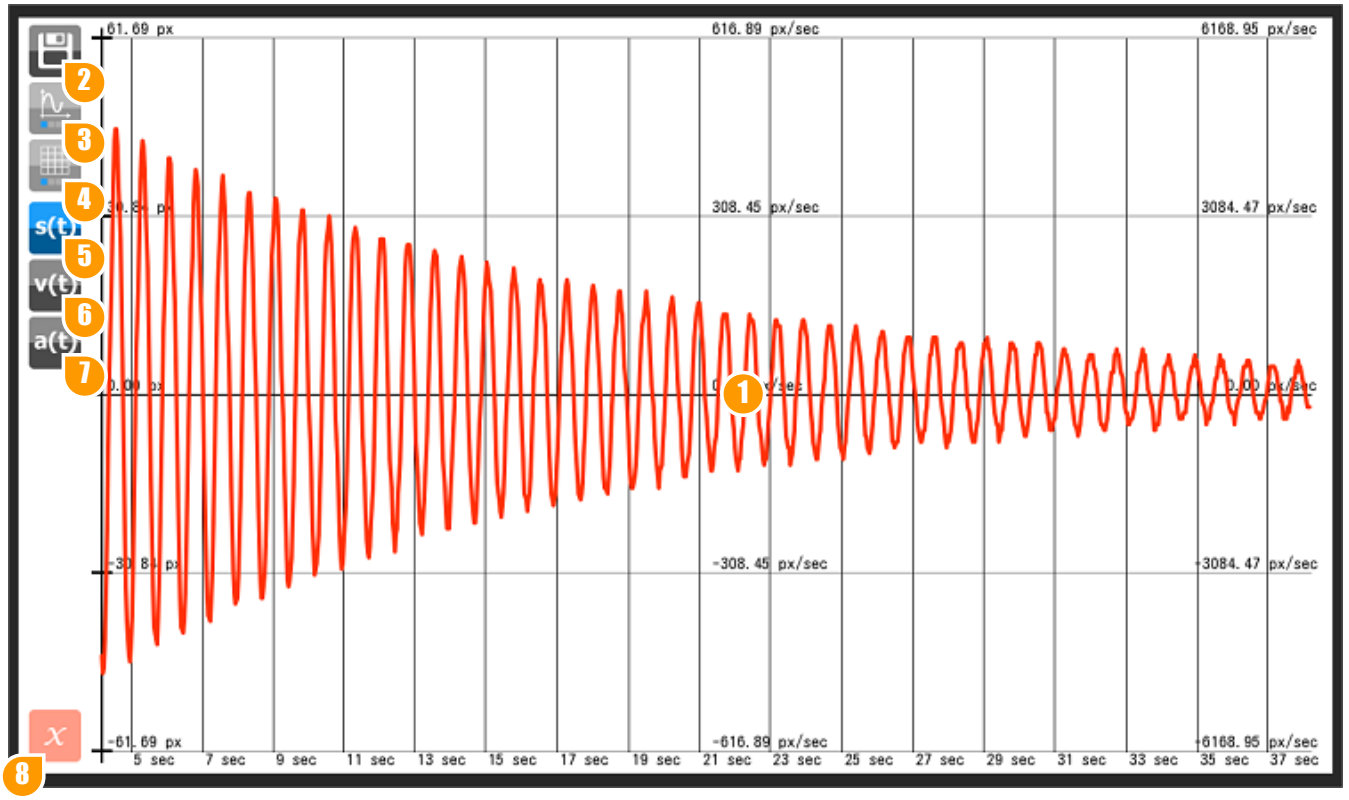
This view will display a gradually fading trace of the object(s).

This view will display a permanent trace of the object(s).

Show diagram on the camera screen.

7. Choose to display displacement, velocity or both.
8. Load a pre-recorded video. This feature is particulary useful if there is no time for a real-time setup or the experiment can be dangerous.
9. Delete object.
10. Choose which axis you would like to monitor. Press to select x, y or xy.
11. Press to display recorded diagram. NOTE: this button gets active after successful recording.

Diagram View

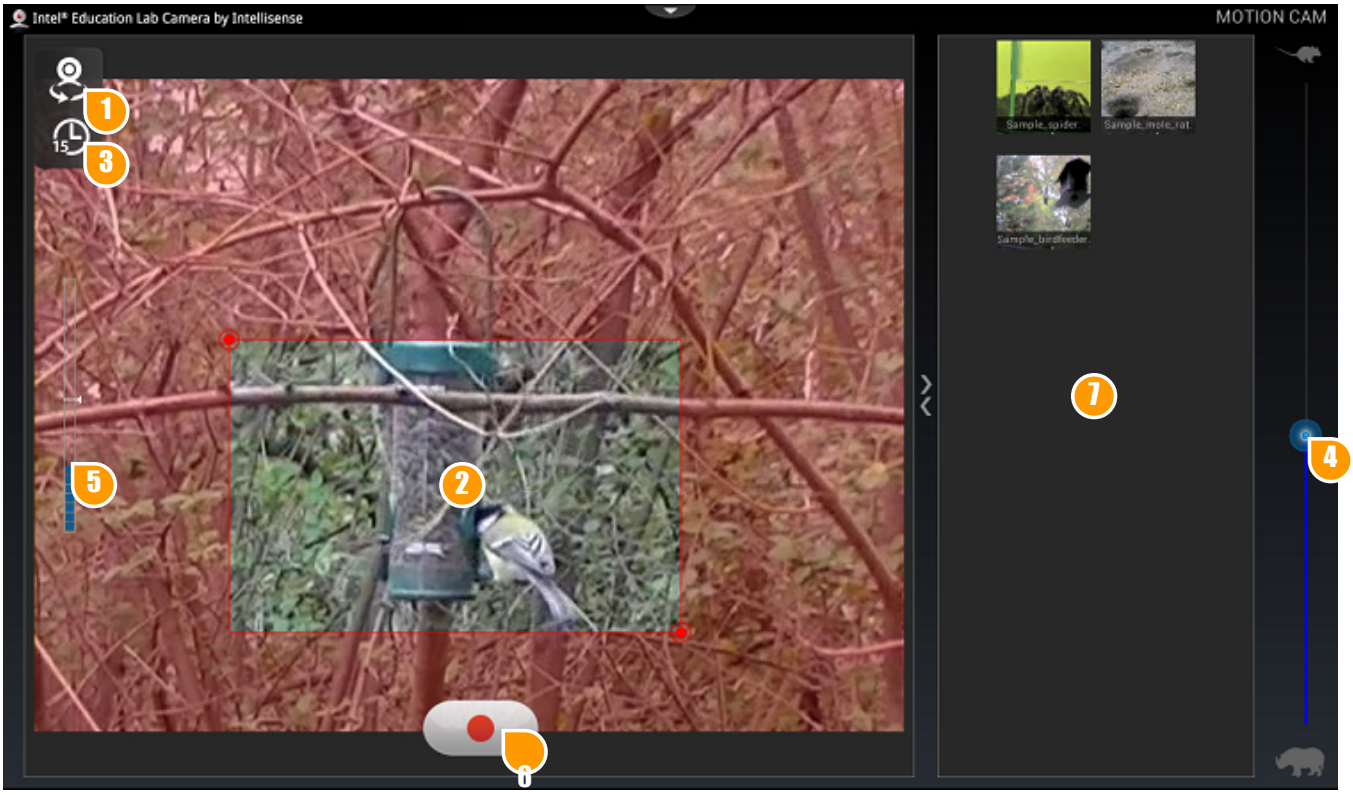


1. Pinch screen vertically to zoom diagram vertically. Pinch horizontally to zoom horizontally. Slide screen to show desired fragment.
2. Save diagram as image. The image will be save do your external storage.
3. Smooth diagram. Note: In some cases smoothing can significantly alter your diagram.
4. Set grid density.
5. Display s(t) (displacement).
6. Display v(t) (velocity).
7. Display a(t) (acceleration).
8. Chose movement axis along which you would like to display your diagram.

MOTION CAM

The Motion Cam function makes a recording when it detects movement in front of the camera, allowing you to capture rare and intimate situations in nature. It works just like motion-sensor cameras.

Recording Mode



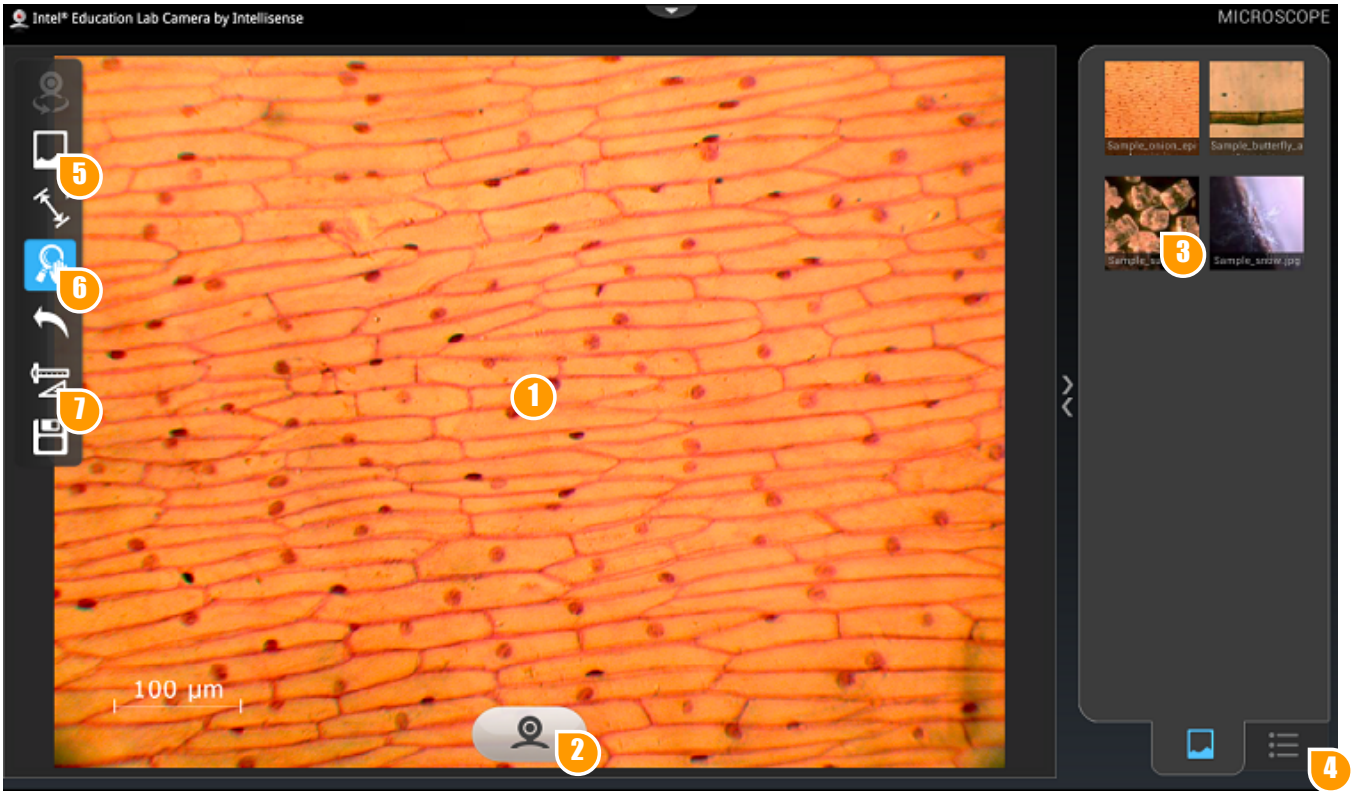
1. Toggle front/rear camera.
2. Set the bounding box to the desired size. The bounding box indicates the area where movement detection is active, e.g. if you want to record activity around a bird feeder, limit the size of the bounding box to it's close vicinity.
3. Tap to set video duration to 15, 30, 60 sec.
4. Drag to set how sensitive the software should be to movement speed.
5. The motion level indicator shows the actual motion level. The recording is triggered whenever the indicator exceeds the threshold line.
6. Your recorded video will be added to the thumb list. The video file will be saved to your external storage in "/Lab Camera/MotionCam" folder.
7. After all is set, tap the Record button to switch to recorder standby mode. Recording will start when the motion level in the sensitive area exceeds threshold set by the motion level slider.

Playback Mode.

1. Press a thumbnail to play back video.
2. Press to play / pause video.
3. Use the seek bar to jump to desired fragment.
4. Switch to camera view.

MICROSCOPE

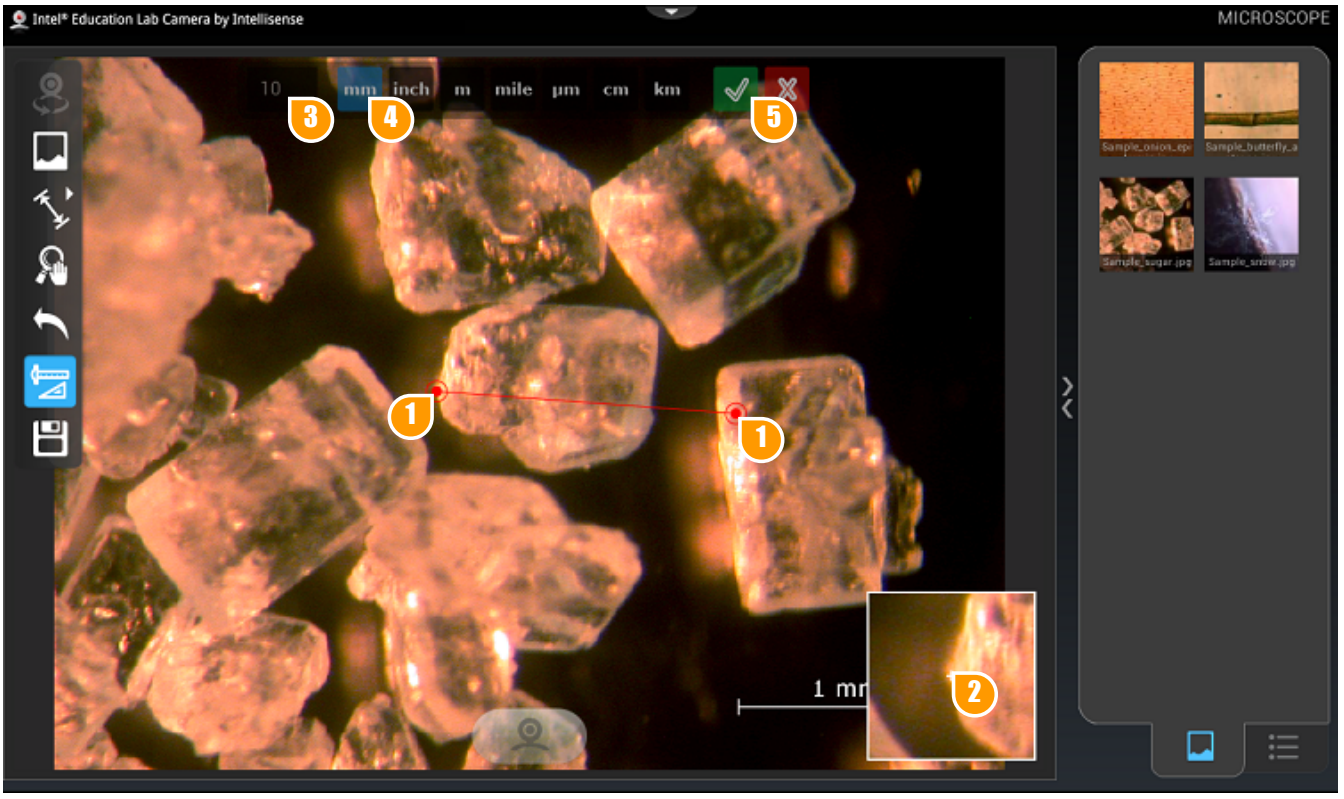
The Microscope feature allows you to carry out microscopic measurements and also to perform any kind of measurement when a reference value is available (ie. the moon's diameter). Web cameras are able to capture extremely close shots, so even single-celled organisms can be observed as well.



1. Your camera will start automatically upon software start up. Its stream will be visible in the camera window.
2. **Take a picture** | Press to take a still image from the camera stream.
3. Load image from thumb list.
4. Press to display measurements list
5. Press to load image from a custom location
6. **Pan / Zoom** | Tap to use one finger pan. Pinch in / out to zoom.
7. Tap to enter calibration mode.

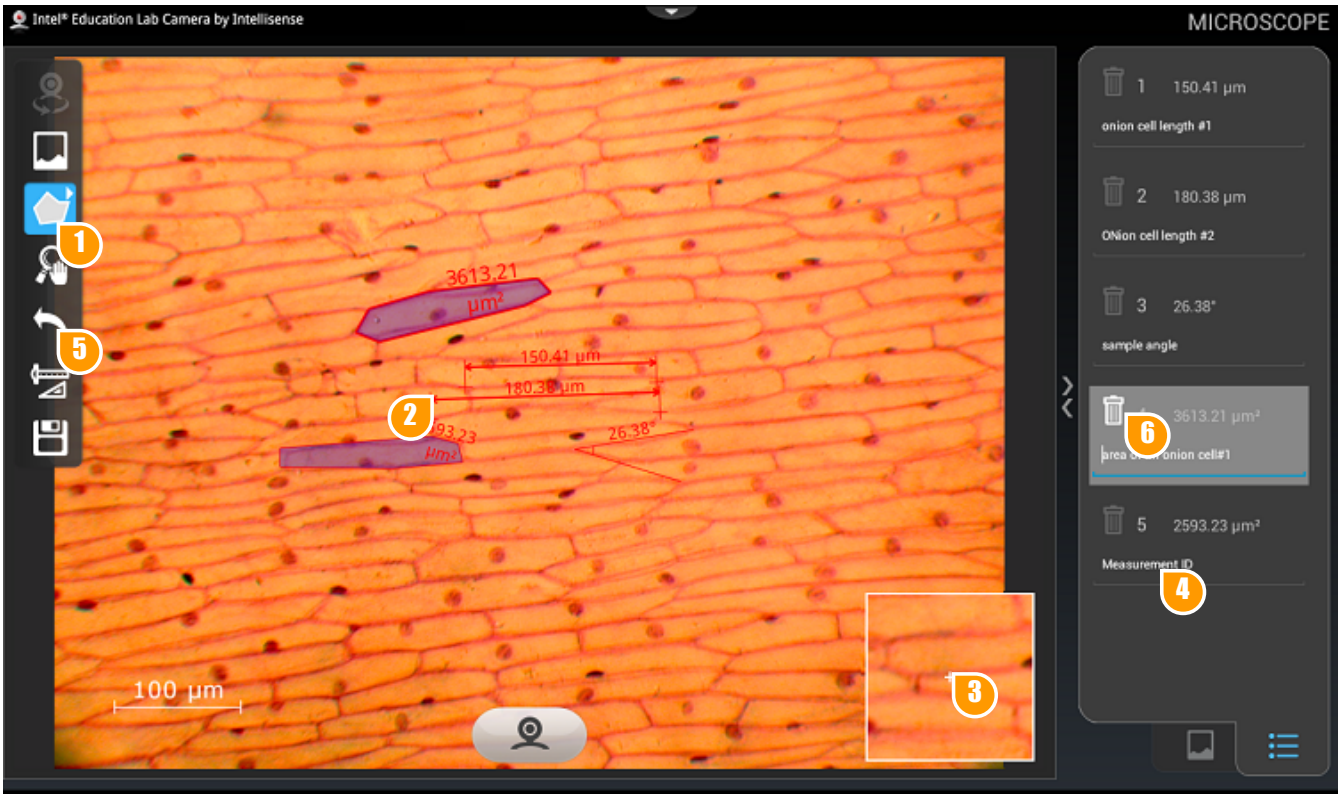
Calibration

Calibration lets you measure objects in your camera view. If you know one dimension of the examined object, you can use it as a reference to calibrate. In order to calibrate your camera view, place an object of known size (eg. mechanical pencil refill lead) in front of the camera in the same plane where your target object is located and tap the calibration button. You can also use our printable scale sheets available at http://www.webcamlaboratory.com/downloads.php



1. Drag the endpoints of your calibration line to match the edges of the object you know the size of. Note: preloaded images come with a calibration scale.
2. The close vicinity of your endpoint will be displayed in the small window to enable precise positioning.
3. Set the size value of the calibrated object.
4. Set the measurement unit.
5. Confirm or decline your choice.

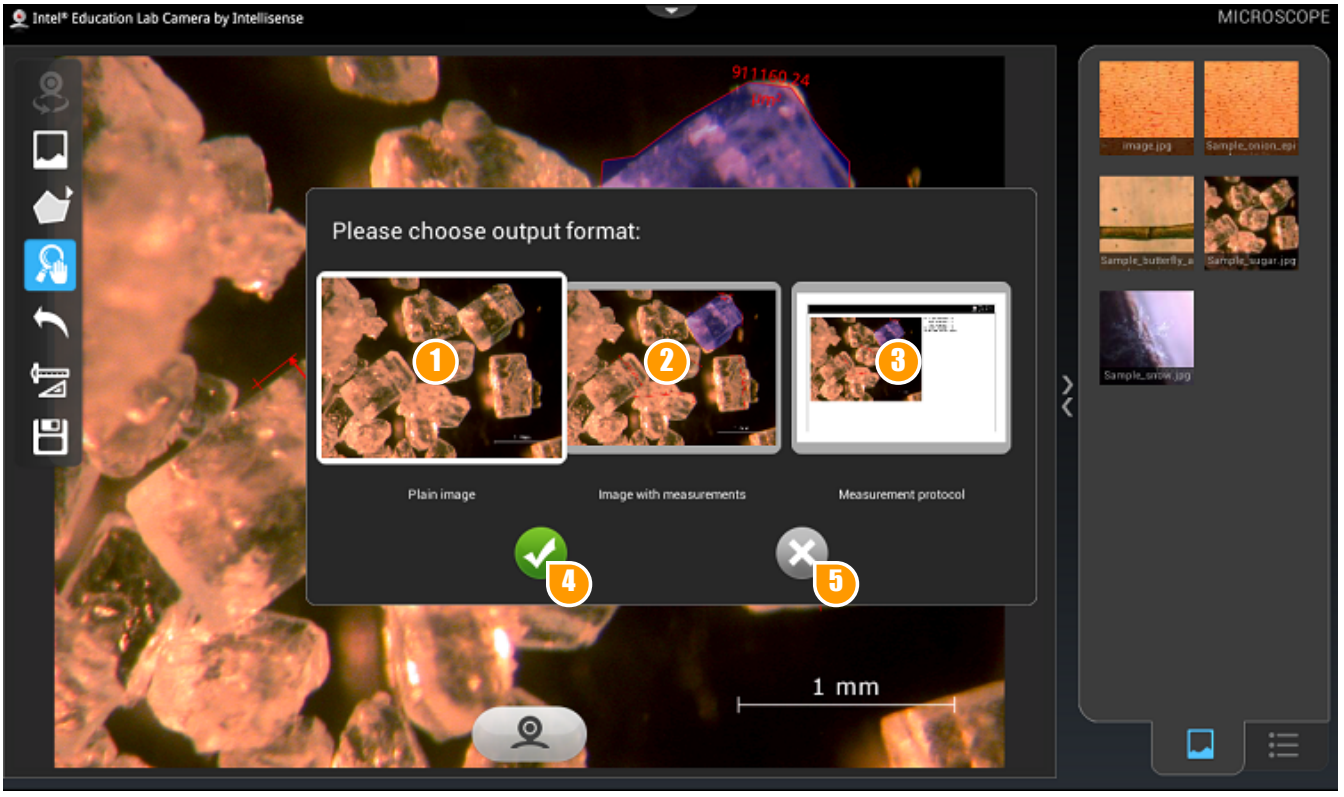
Making Measurements



1. Chose the kind of measurement you would like to make. Available options: length, angle, area.
2. Place the endpoints on the screen. For length measurement you have 2 endpoints, for angle 3. For area measurement you can define as many points as you wish. To close an area, make sure that the last point overlaps with the first one.
3. Use the guide window for precise placing.
4. Your measurements will get displayed in the measurements list. You can edit its description by selecting it. NOTE: Measurement description is limited to 25 characters.
5. Press to undo last measurent. You can undo as many measurements as you want.
6. Press the bin icon to remove selected measurement.
7. Press the bin icon to remove selected measurement.

Saving

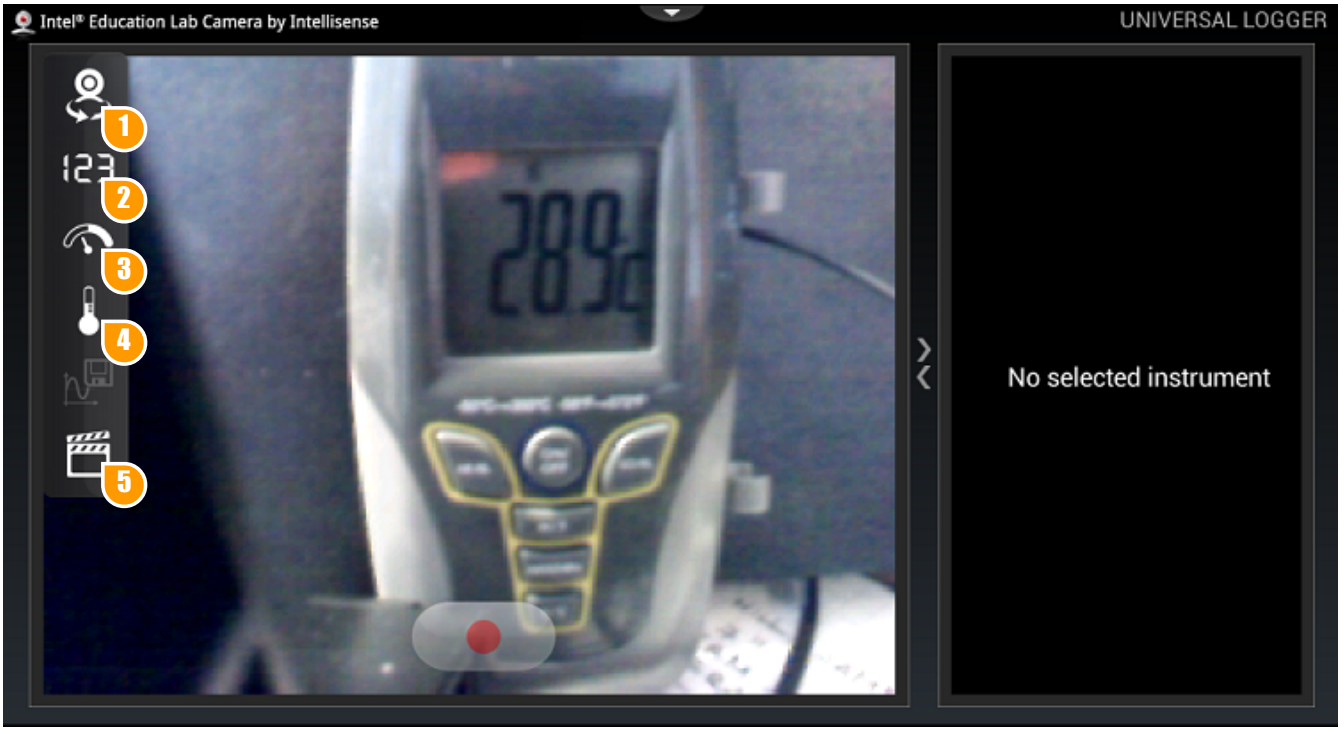
Once you have finished, choose one of the following saving options:



1. Save as plain image.
2. Save with measurements displayed on image.
3. Save as measurement protocol.
4. Press to confirm saving.
5. Press to cancel saving.

UNIVERSAL LOGGER

Universal Logger is a very unique, real time, data recognition module that can register real-time readings of any instrument that has digital, radial dial or liquid-in-glass display. All your obsolete measurement devices in school that cannot be connected to a computer are made useful again. You can use Universal Logger to recognize two instruments at the same time.



1. Toggle front/rear camera.
2. Press to use a measuring instrument with digital display.
3. Press to use a measuring instrument with radial dial display.
4. Press to use a liquid-in-glass measuring instrument.
5. Load a pre-recorded video. This feature is particulary useful if there is no time for a real-time setup or the experiment can be dangerous.

Calibration

1. When you press the Digital Display icon, a 3-cell grid will appear. Each cell represents one digit on your device. In case you need more or less cells, use the +/- buttons on the top edge of the grid. You can add cells to represent up to 6 digits. Each corner of the main grid is an active corner. The circles on the bottom edge represent the decimal places. Tapping one of them results in placing the decimal mark between the corresponding cells.
   - a. Drag this corner to the top left corner of the display area of your measuring device.
   - b. Drag this corner to rotate the grid.
   - c. Drag this corner to skew the cells in case you have a device with italic digits.
   - d. By dragging this corner you can enlarge/reduce the grid to accommodate all digits on the display.
2. Observe the recognized value and make sure it matches the actual readings of your measurement device.
3. Set the minimum and maximum values of your measurement range.
4. Set the probe interval to desired value. For slow changes the probe interval can be longer. In case of faster changes a shorter interval is recommended to obtain a smooth diagram.
5. Press the bin icon to delete the selected template.
6. Load a pre-recorded video. This feature is particulary useful if there is no time for a real-time setup or the experiment can be dangerous.

The goal is to align the grid with the display in such a way that each cell covers one digit and the decimal mark is in the same place as on the device. NOTE: reflection of light and insufficient lighting may affect the accuracy of readings.

1 When you press the Liquid-in-glass icon, a liquid-in-glass instrument template will appear. Calibration of this component is similar to that of the digital display. Each end of the template is an active end.

a,b Position the template to the image of your instrument to accommodate the reading area. If setup is successful, the readings shown in the right panel should show the actual readings of your instrument.

If setup is successful, the readings shown in the right panel should show the actual readings of your instrument.

1 When you press the Radial Dial Display icon, a radial display template will appear. Calibration of this component is similar to the Digital Display icon. Each corner of the template is an active corner.

a Drag the vertex point to move the template around. The vertex point's position should be aligned with the center of rotation of the instrument's hand.

b,c Adjust the two endpoints of the template to accommodate the dial scale of your instrument.

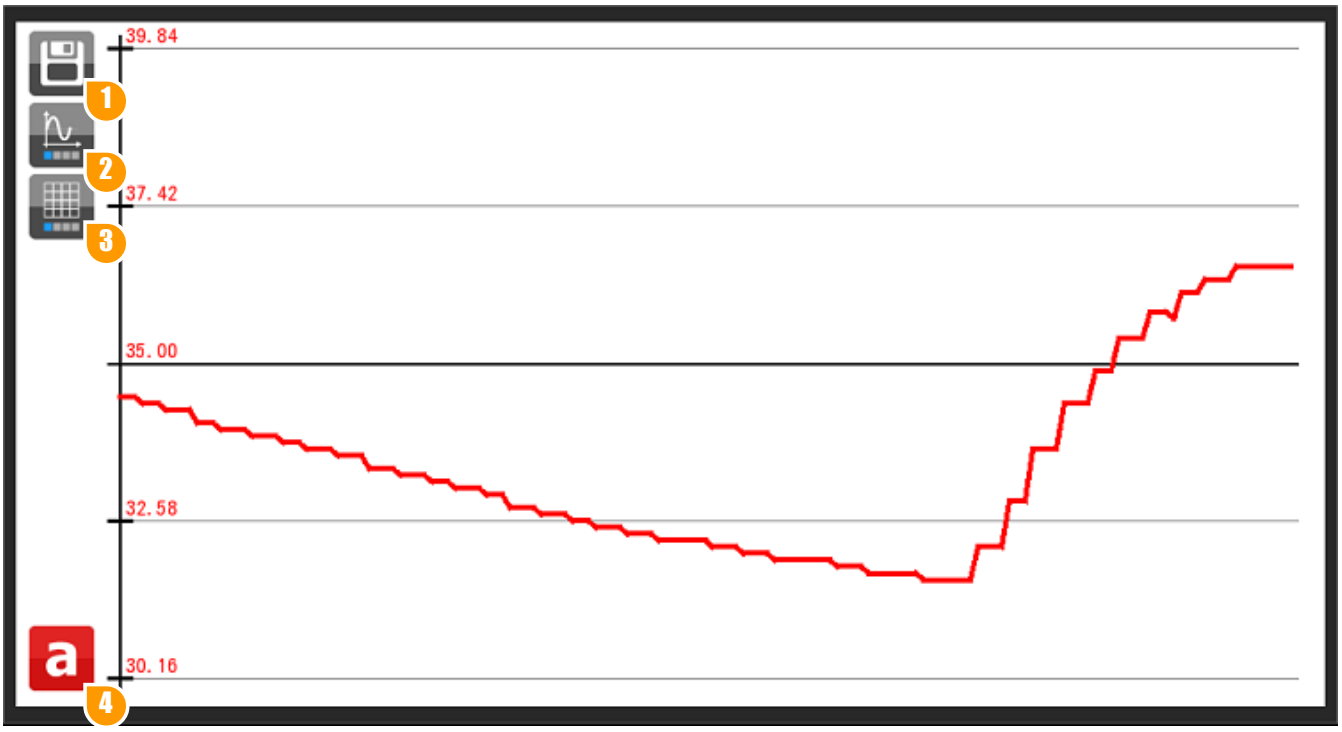
d Set the width of the dial scale.

If setup is correct the arm of your template should cover the arm of your instrument. Set the minimum and maximum values of your device using the right panel. Please also note that reflection of light and insufficient lighting may affect the accuracy of readings.

Measurement Recording

1. When all set, press the recording button to start logging the measured values.
2. The right panel will display the real-time diagram. You can manipulate the display area using finger gestures.
3. Press to display the recorded diagram.

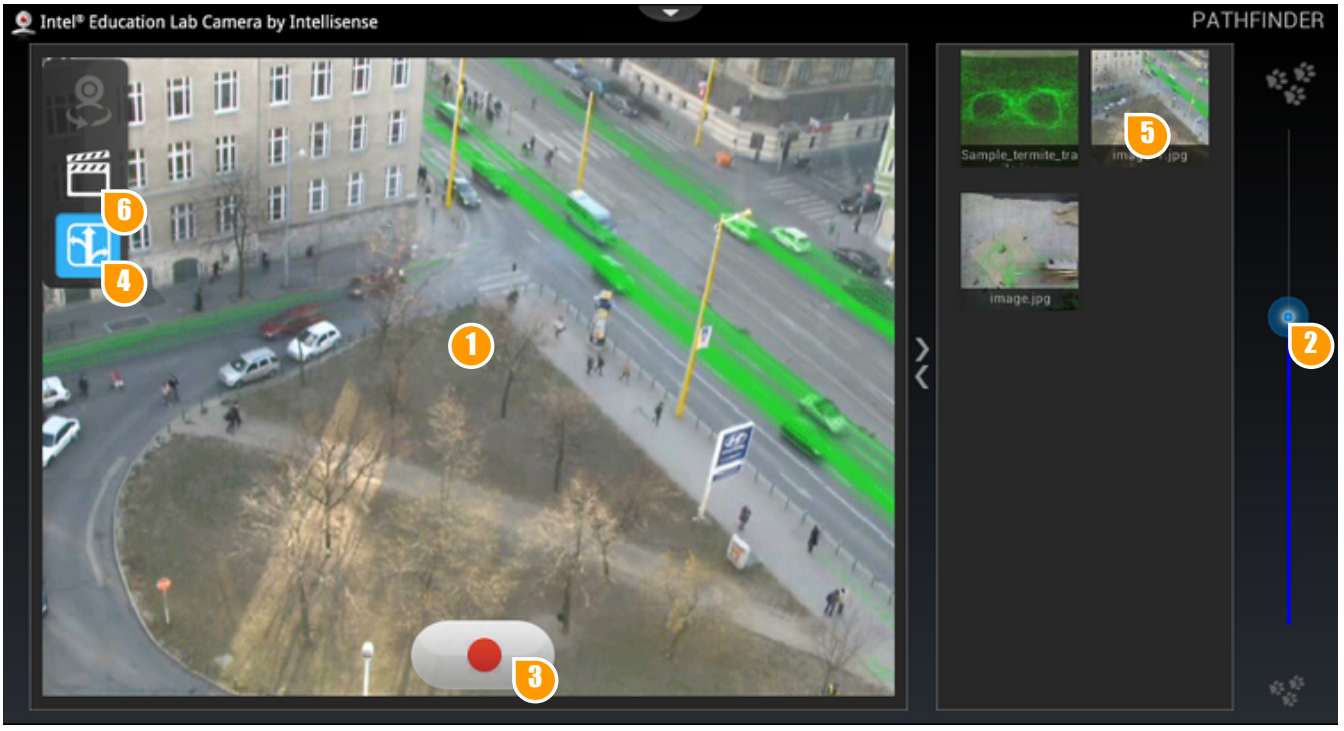
Diagram View



1. Save diagram as image. The image will be save do your external storage.
2. Smooth diagram. Note: In some cases smoothing can significantly alter your diagram.
3. Set grid density.
4. Choose the measuring device (a, b or both) you want the diagram to be displayed from.

PATHFINDER

Pathfinder is practically a motion density map. The more movement occurs, the more colored the attended trails get on the screen. Enjoy tracking traffic density, single-cell organism or trails of ants in an ant farm.



1. Your camera will start automatically upon software start up. Its stream will be visible in the camera window.
2. Set marking intensity.
3. Press Record button to start recording. A red frame around the camera window will start blinking. Press again to stop recording. Your recorded image will be displayed.
4. Press to toggle Color Map and Path Map modes. The image file will be saved to your external storage in "/Lab Camera/Pathfinder" folder.
5. Your recorded image will be added to the thumb list. The image file will be saved to your external storage in "/Lab Camera/Pathfinder" folder.
6. Load a pre-recorded video. This feature is particulary useful if there is no time for a real-time setup or the experiment can be dangerous.

GRAPH CHALLENGE

Play with curves and learn representation of movement in a coordinate system using Graph Challenge. All you need to do is pick a curve and select an object. Next, move the selected object or your mobile device around to match your curve as close as you can.

The goal is to move an object in such way that it's movement curve overlaps the predefined curve as much as possible. The software calculates the score in percentage of matching and saves it in the score list.

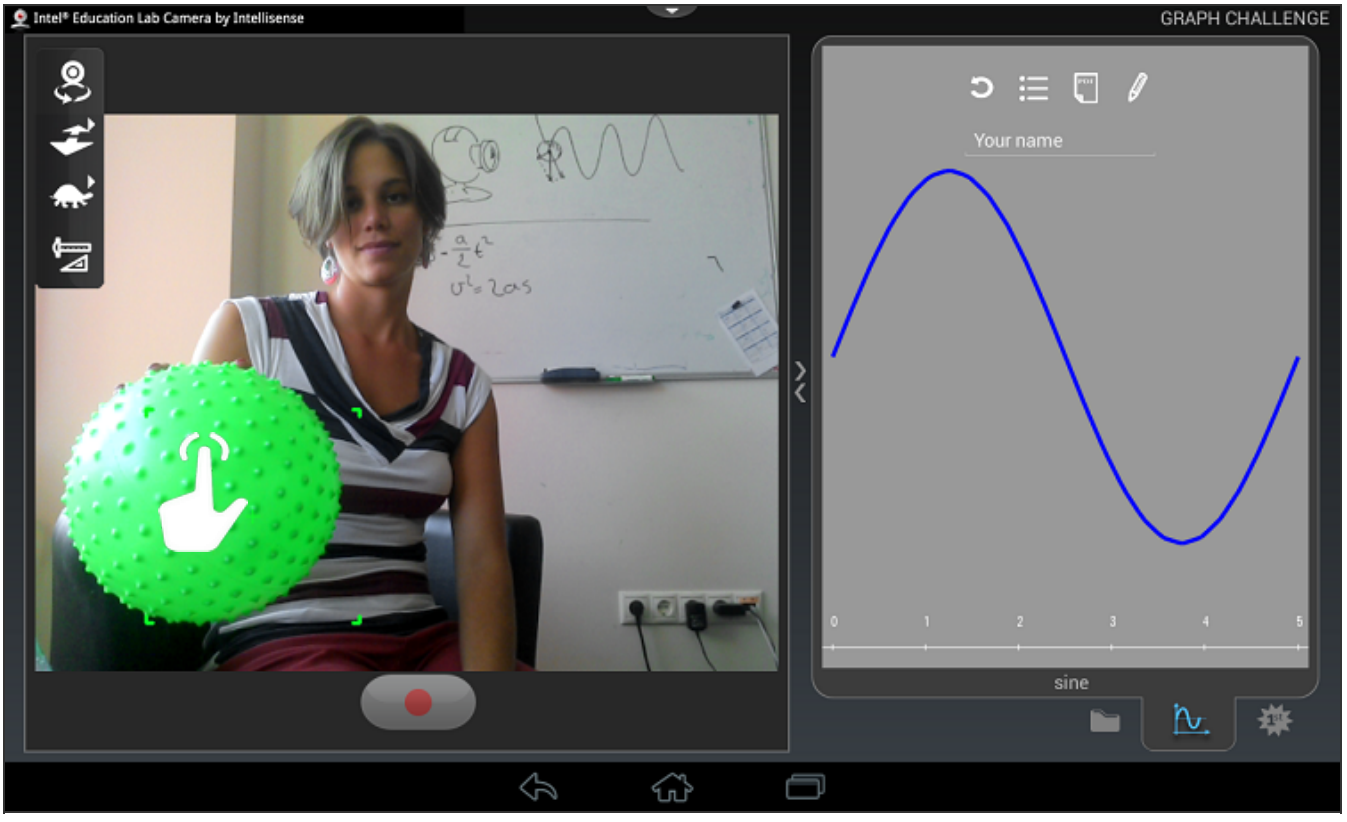
You can chose from horizontal, vertical, closer-further or rotation modes.

Object Tracking

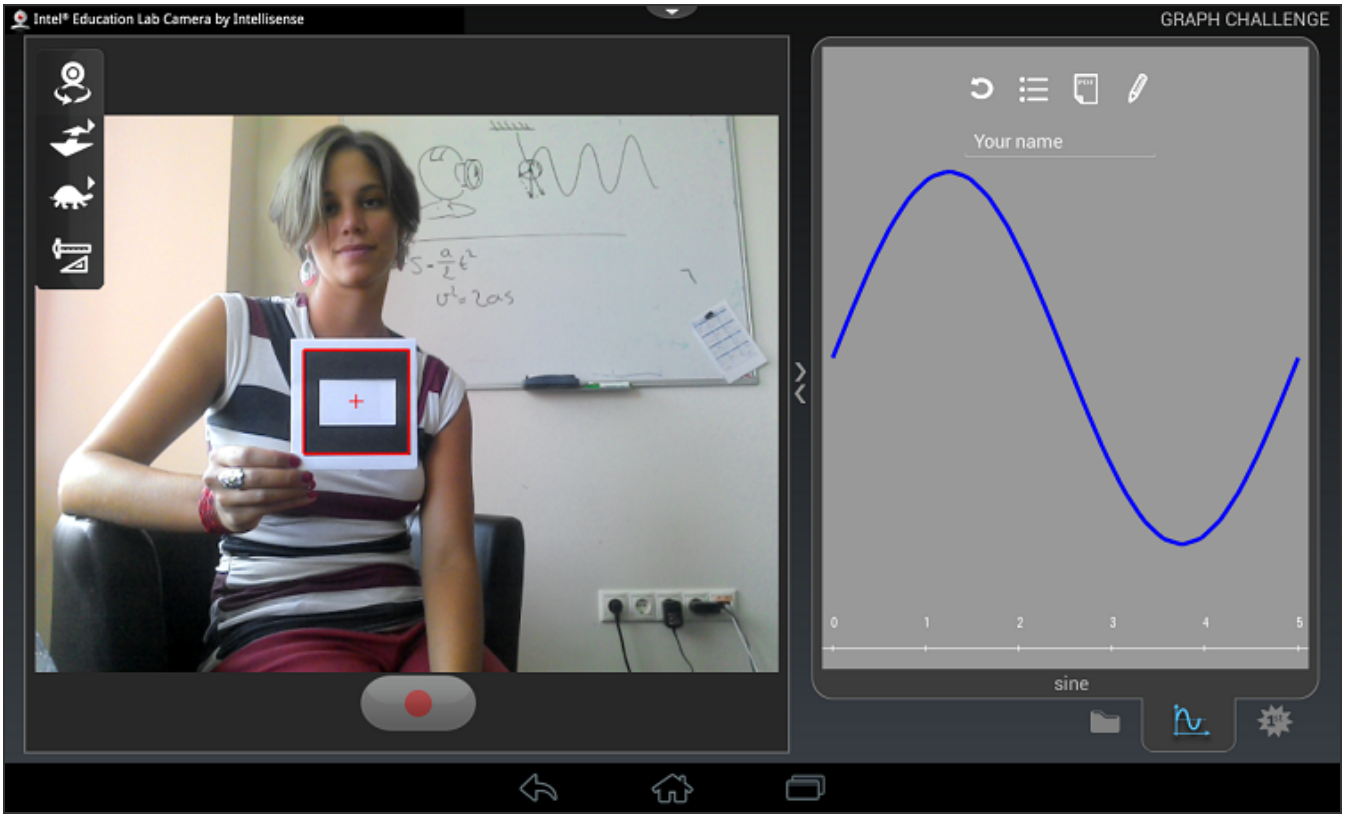
You can use any colored object or a predefined marker with Graph Challenge. If you choose to track a colored object, please make sure that this color does't occur in the background of the object. NOTE: Rotation matching is only available when using predefined marker.

You can print the marker from the pdf file located in your Graph Challenge folder or use the image from the appendix at the bottom of this manual.

In order to select a custom (colored) object for tracking, press the object on your camera screen. A colored bounding box around the object will indicate a successful selection.



If you want to use the predefined marker for tracking, all you need to do is to bring the marker into the camera's viewport. It gets recognized automatically and you can start calibration or matching the curve right away. NOTE: when holding the marker, make sure that the whole marker is visible - don't cover the black frame with your fingers.



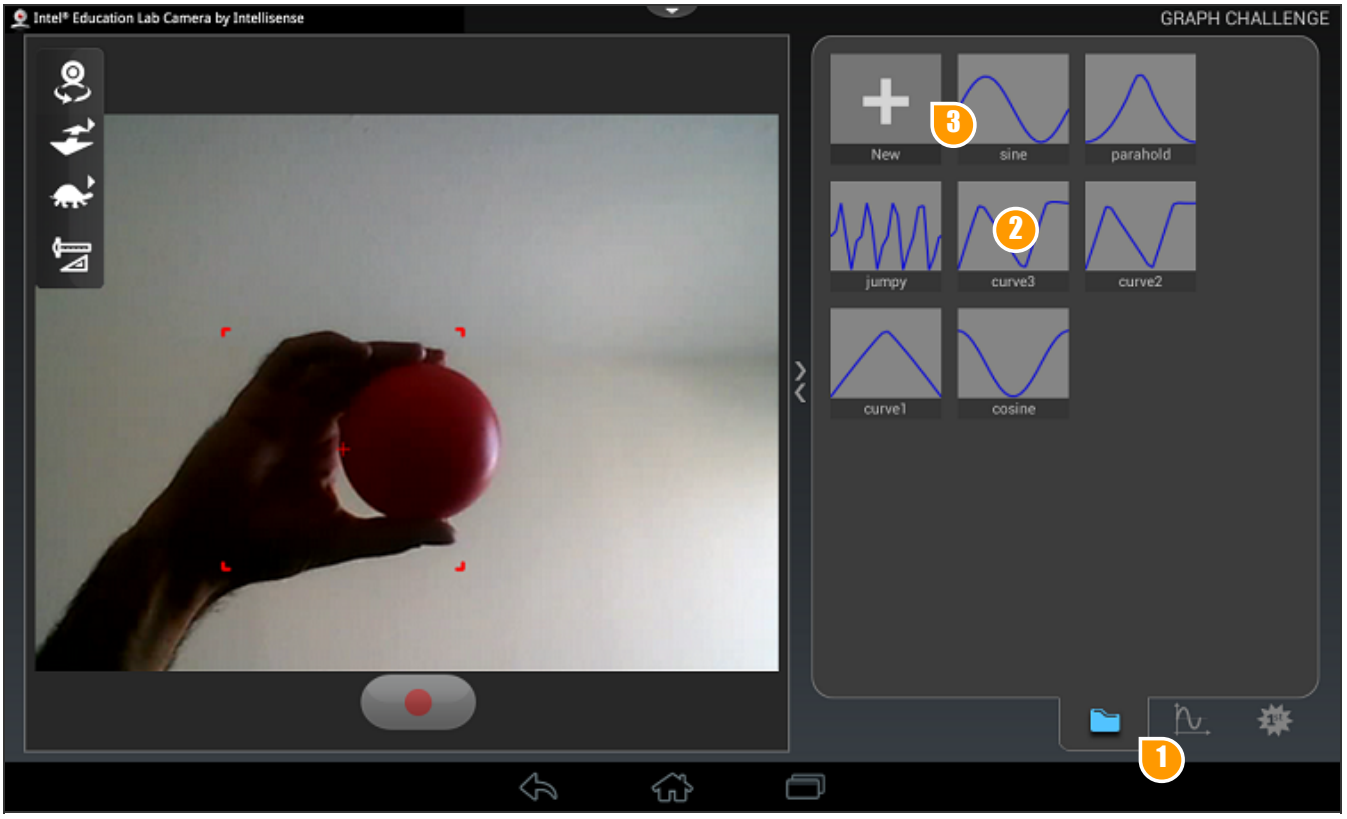
Movement Control

There are two ways to move your object around in the camera view:

- you can either move the object in front of a steady camera, or

- move your camera in front of a steady object.

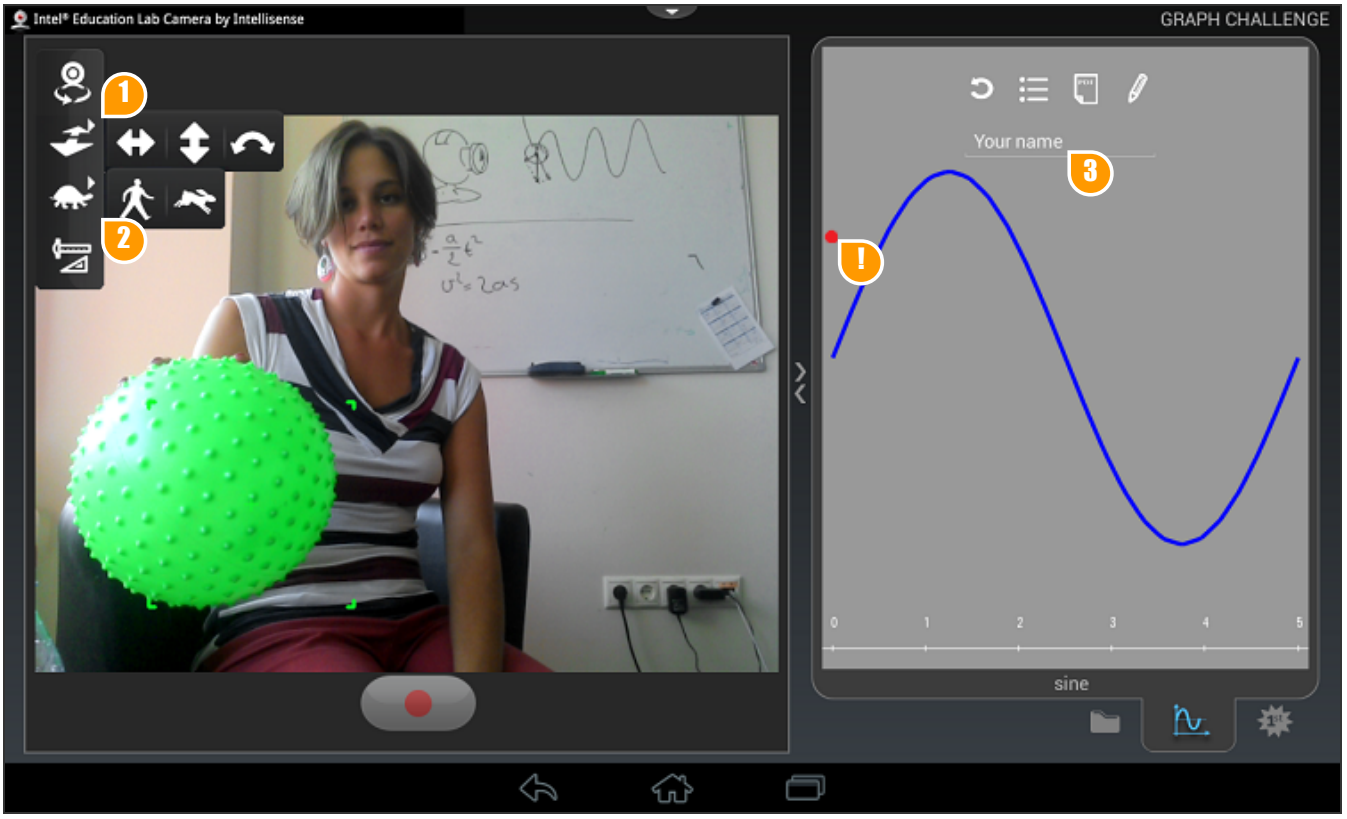
Select A Curve



1. If all set, press the record button to start the challenge!
2. To select a curve, simply press its thumbnail
3. Press the "New" thumbnail to create a new curve. This action will open the editor window. Please find the editor help in the "Curve editor" section below

Game Options

Before starting a game, you need to set it up using the following controls.



1 Set the direction of your movement.

! NOTE: The position dot shows you the current placement of your object. You can chose from one of the following direction modes:

- Closer - further
- Horizontal
- Vertical
- Rotation

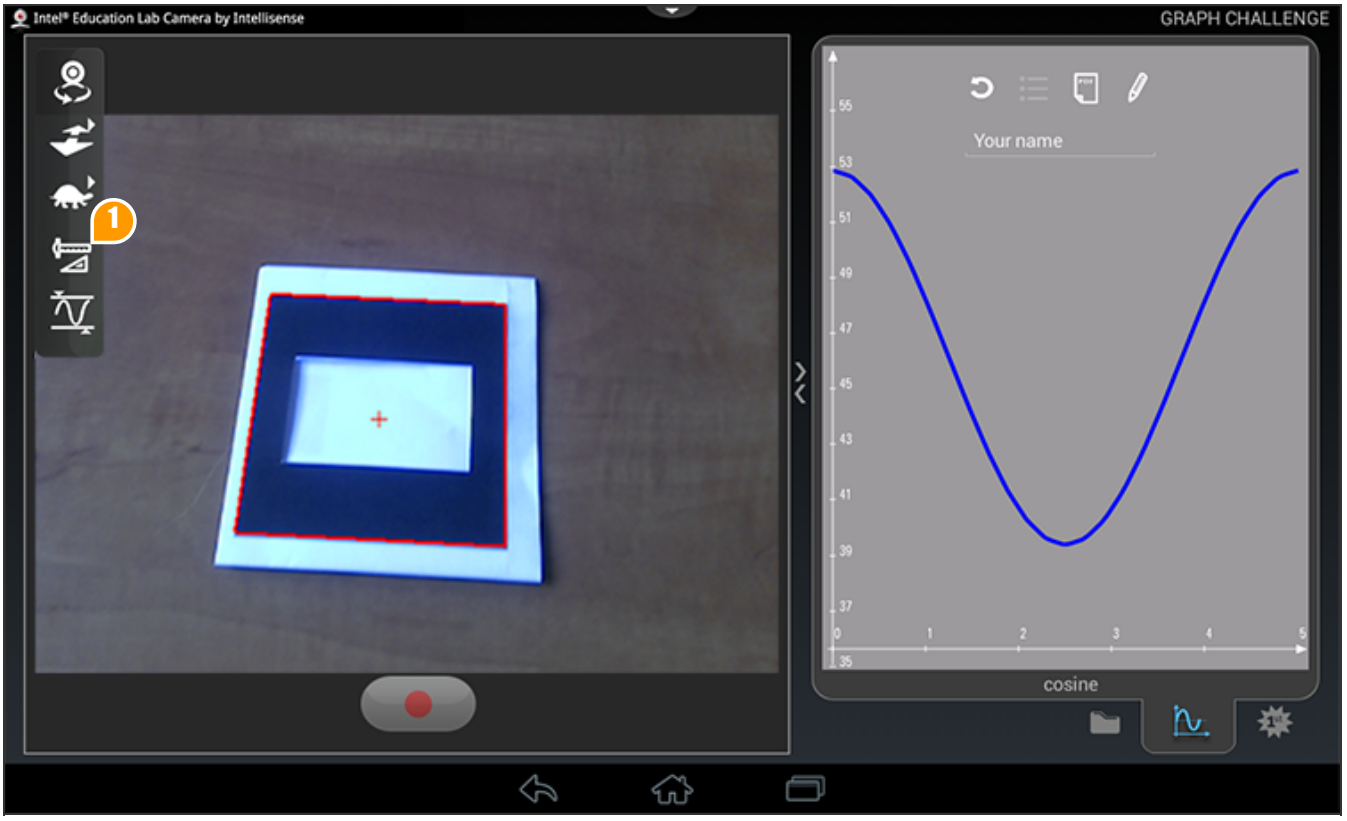
2 Set challenge speed

- Slow
- Normal
- Fast

3 Optionally, you can input your name here. This name will be displayed in the scores panel and in the hall of fame. Inputting your name is particularly useful if several players take turns to match the same graph and would like to distinguish their results.

Size And Distance Calibration

To make sure that the y-axis of your diagram shows proper values, you will need to calibrate your object's size and / or distance from the camera.

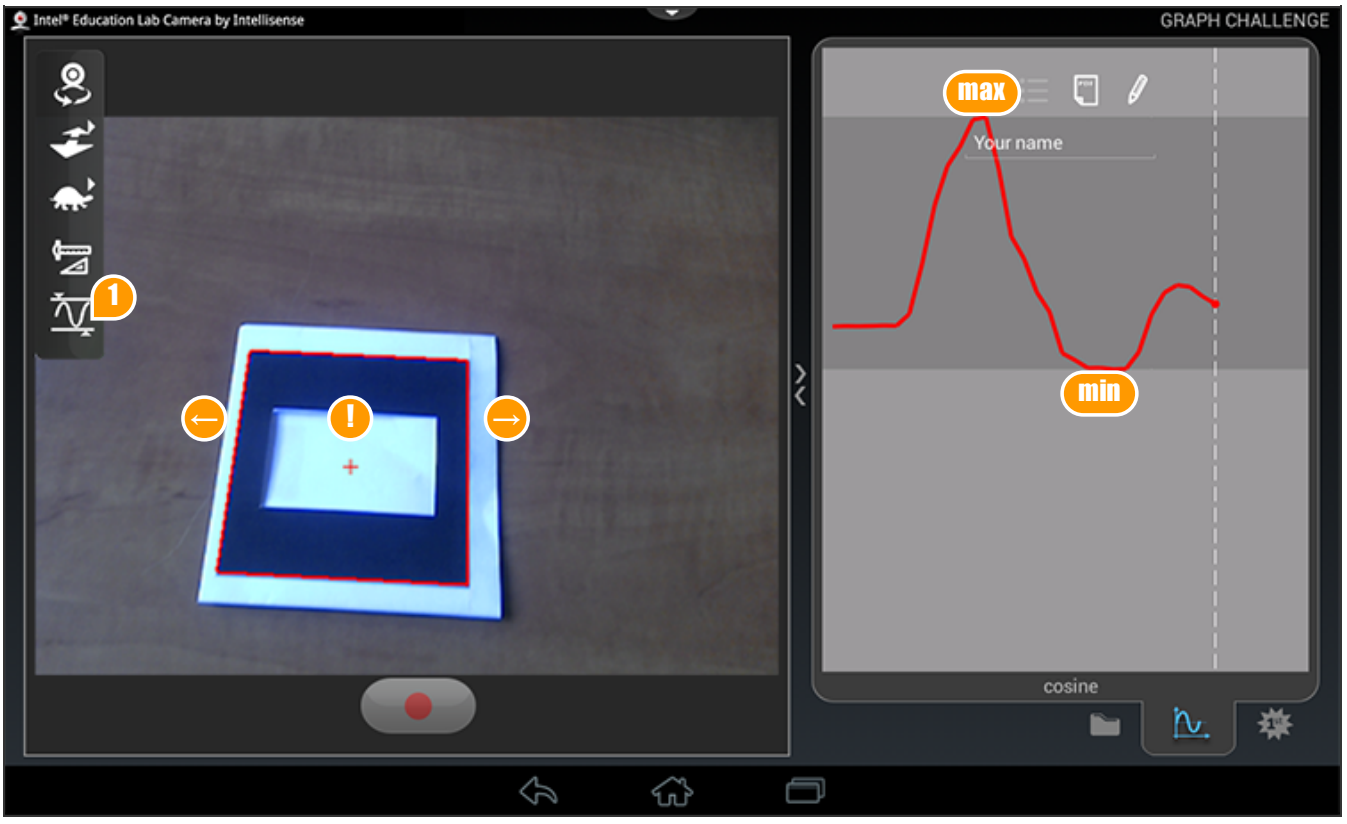


1. Press to start size and distance calibration wizard. The wizard will guide you through the calibration steps.

Movement Area Calibration

After selecting an object for tracking, you will need to calibrate your movement area to make sure that the object's movement can reach highest and lowest values of your curve. Once calibrated, you can use Graph Challenge as many times as you want provided that the placement of your camera and the tracked object is the same as during calibration.

When calibration starts, you will see a curve representing your object's movement in the right panel . Move your object up-down, left-right, closer-further or rotate (depending on the chosen tracking mode) to register the highest and lowest values your curve should accommodate to. After 5 seconds the calibration will stop if there were two clear endpoints registered.

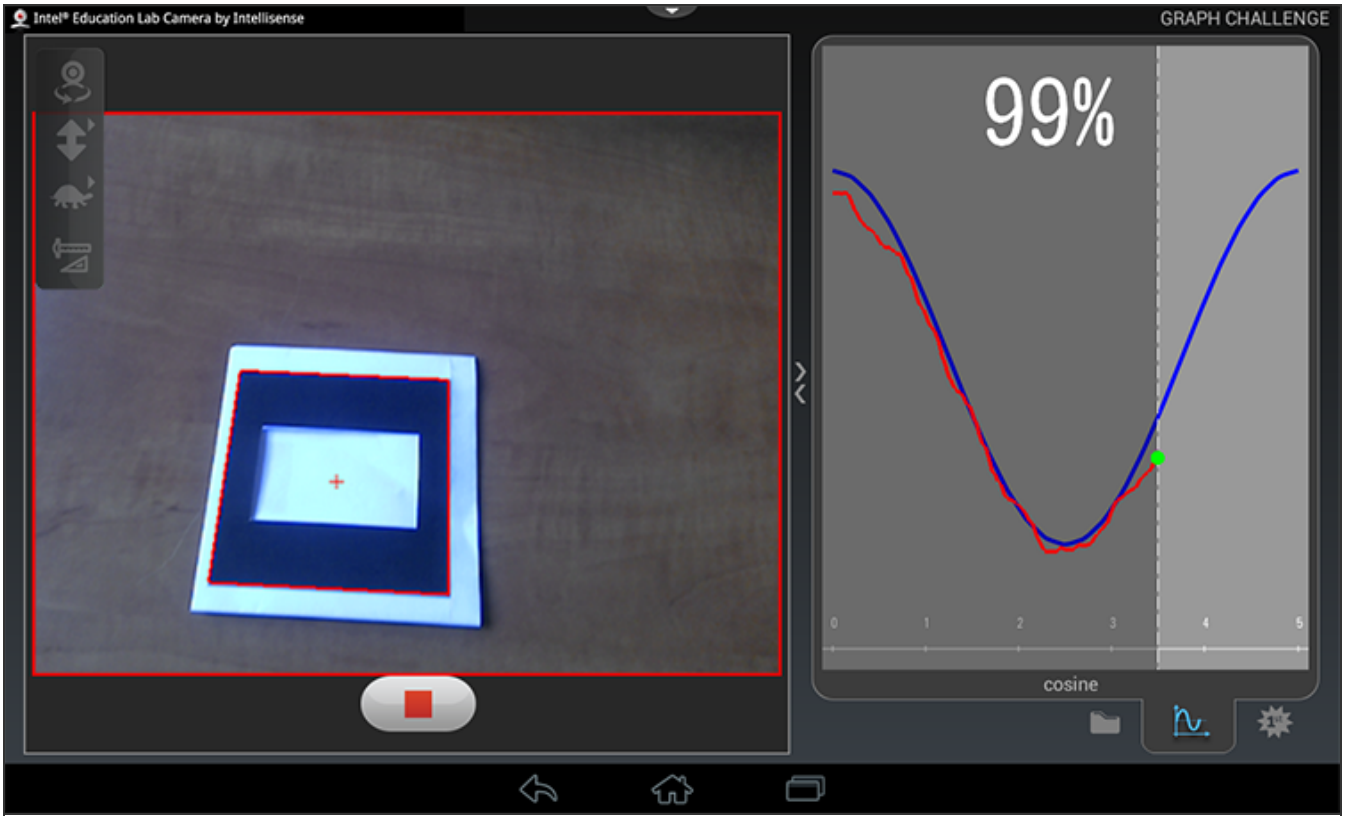


1. Press calibration button located on the bottom bar

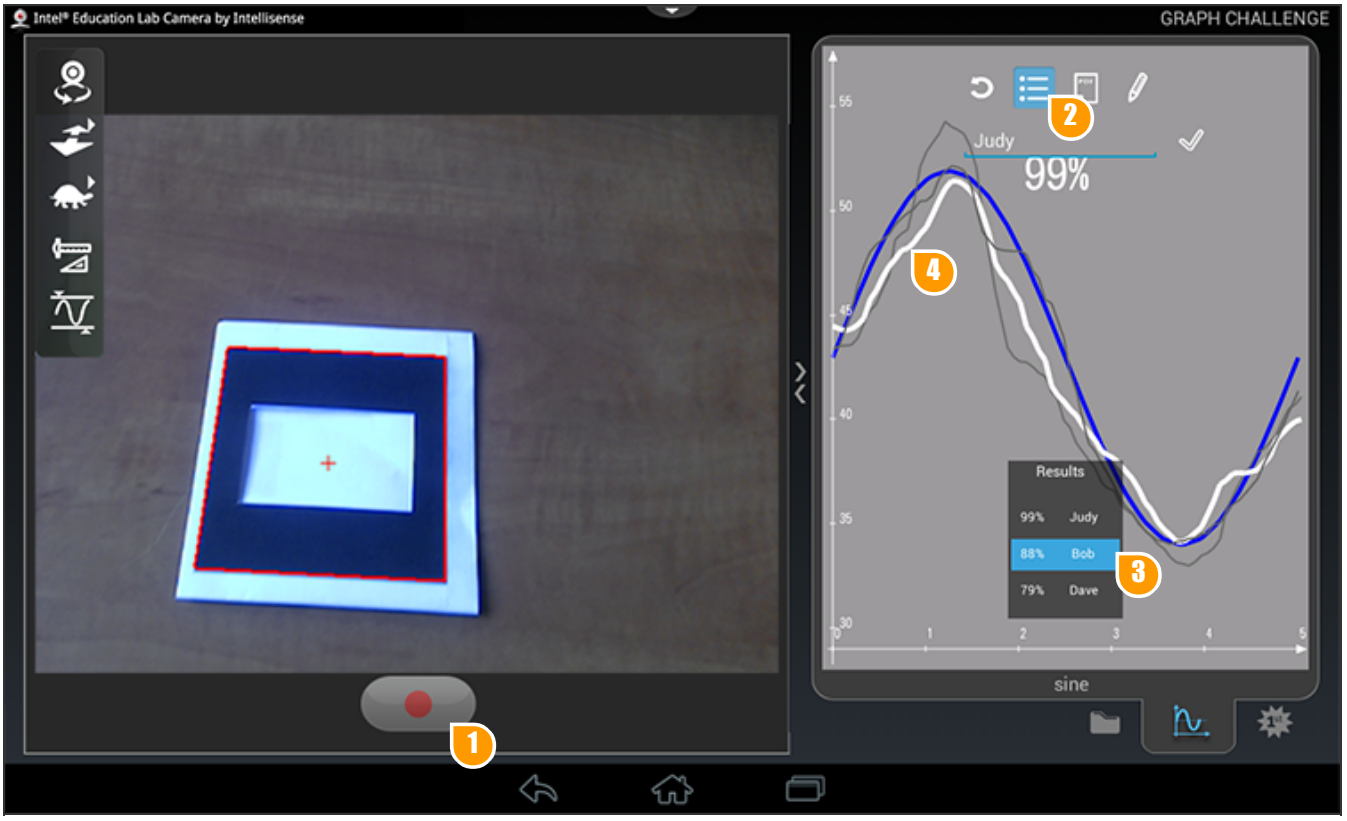
Playing The Challenge

If all set, press the record button to start the challenge!

When you hit start a counter will start counting back from 5. When matching starts, a vertical dashed line will indicate the elapsed time on the curve. Your goal is to match the curve as close as you can. Your score will be displayed continuously.

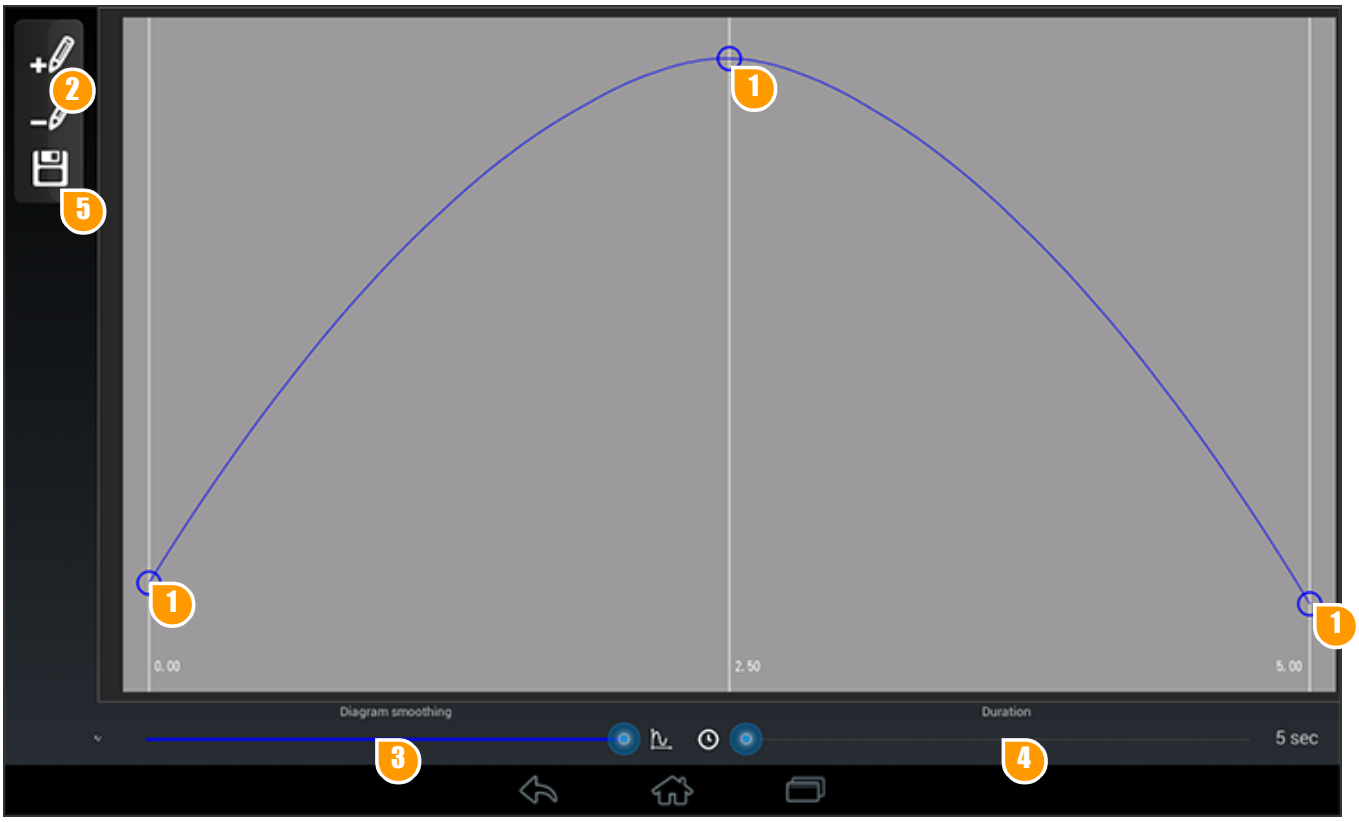


Results



1. Press the "Record" button to start a new challenge with the same settings.
2. Press the "Results" button to display the latest results in this session.
3. The results panel lets you review previous matches in the same session.
4. The selected curve will be highlighted.

Curve Editor



1. Slide the hotspots up or down to change curve shape.
2. Use the Add / Remove points button to define or delete new points for the curve. NOTE: the more points the more complex curves can be created.
3. Smoothen the diagram in order to cut sharp turns.
4. Set the duration of your game. NOTE: The duration combined with the number of defined points will determine the speed of your game.
5. Save your challenge. The saved curve will get displayed in the thumblist.

APPENDIX

Marker Image For Graph Challenge

Please don't cut out the shape, as you need the white background to hold the marker.